Vane Type Power Steering Pump w/Integral Reservoir

INDEX

	Page No.		Page No.		Page No.
Description	15-3	Component Service	15-5	System Flush	15-4
Diagnosis & Testing	15-3	1997–98	15-5	**Tightening Specifications**	15-7
System Test	15-3	1999–2001	15-5	**Troubleshooting**	15-3
Power Steering System Bleed	15-5	**Power Steering System Service**	15-4		

DESCRIPTION

The hydraulic pump is a submerged, vane-type design. Submerged pumps have a housing and internal parts inside the reservoir and operate submerged in fluid.

There are two openings at the rear of the pump housing. The larger opening contains the cam ring, pressure plate, thrust plate, rotor and vane assembly and the end plate. The smaller opening contains the pressure line union, flow control valve, and spring. The flow control orifice is part of the pressure line union. The pressure relief valve, located inside the flow control valve, limits pump pressure.

TROUBLESHOOTING

Refer to **Fig. 1,** for troubleshooting diagnosis of power steering system.

DIAGNOSIS & TESTING

SYSTEM TEST

All tests are made with engine idling at normal operating temperature. Check idle speed adjustment and, if necessary, adjust to correct specification.

USING POWER STEERING GAUGE

1. Ensure ignition switch is in Off position.
2. Place suitable container under steering gear or pump.
3. Disconnect pressure hose at steering gear or power steering pump.
4. Install power steering pressure tester tool No. J-5176-E, or equivalent, to both hoses. Gauge must be installed between shutoff valve and pump.
5. Open shutoff valve.
6. Remove filler cap from pump reservoir and inspect fluid level. Adjust level as required.
7. Start engine.
8. Inspect connections for leakage while momentarily holding steering wheel against stop. **Do not hold wheel against stop for more than five seconds.**
9. Bleed power steering system.
10. Insert thermometer tool No. J-5421-02, or equivalent, in reservoir filler opening.
11. Move steering wheel from stop to stop several times until thermometer indicates hydraulic fluid has reached operating temperature (150–170°F). **Do not turn steering wheel more than five times without rolling vehicle to change tire to floor contact area.**
12. Inspect and adjust pump fluid level as required.
13. When engine is at normal operating temperature, initial pressure on gauge (valve open) should be within 80–125 psi. If pressure exceeds 200 psi, inspect hoses for restrictions and poppet valve for proper assembly.
14. Open and close gauge valve fully three times. **Do not leave valve closed for more than five seconds.**
15. Record highest pressures attained each time.
16. If pressures are within specifications, and range of readings is within 50 psi, pump is functioning satisfactorily.
17. If pressures recorded are constant but readings vary more than 100 psi, below minimum specification, replace flow control valve.
18. If pressures are still low, replace pump rotating group.
19. If pressure recorded are high, but do not repeat within 50 psi, flow control valve is sticking. Proceed as follows:
    a. Remove and clean valve.
    b. Remove any burrs using crocus cloth or fine hone.
    c. If system contains some dirt, flush system.
    d. If system is exceptionally dirty, both pump and gear must be completely disassembled, cleaned, flushed and reassembled.

PROBLEM	POSSIBLE CAUSE	CORRECTION
Objectionable "Hiss"	Noisy relief valve in the hydraulic pump.	There is some noise in all power steering systems. One of the most common is a hissing sound most evident at standstill parking. Hiss is a high frequency noise. The noise is present in every valve and results from high velocity fluid passing valve orifice edges. There is no relationship between this noise and performance of the steering. "Hiss" may be expected when steering wheel is at end of travel or when slowly turning at standstill. Do not replace valve unless "hiss" is extremely objectionable. A replacement valve will also exhibit slight noise and is not always a cure for the objection.
Rattle Or Chuckle Noise In Steering Gear	1. Gear loose on the frame. 2. Steering linkage looseness. 3. Pressure hose touching other parts of vehicle 4. Loose pitman arm. 5. Improper over-center adjustment. A slight rattle may occur on turns because of increase clearance off the "high point." This is normal and clearance must not be reduced below specified limits to eliminate this slight rattle.	1. Check the gear mounting bolts. Torque the bolts to specifications. 2. Check linkage pivot points for wear. Replace if necessary. 3. Adjust the hose position. Do not bend tubing by hand. 4. Torque the pitman arm bolt. 5. Adjust to specifications.
Excessive Wheel Kick-Back Or Loose Steering	1. Air in the system. 2. Steering gear mounting loose. 3. Steering linkage joints worn. 4. Front wheel bearings incorrectly adjusted or worn. 5. Steering gear improperly adjusted. 6. Worn or missing poppet valve 7. Damaged or worn steering gear.	1. Add oil to the pump reservoir and bleed. Check hose connectors for proper torque. 2. Tighten attaching bolts to specified torque. 3. Replace loose parts. 4. Adjust the bearings or replace with new parts as necessary. 5. Adjust to specifications. 6. Replace the poppet valve. 7. Disassemble and repair the steering gear.
Vehicle Leads To One Side Or The Other (Keep In Mind The Road And Wind Conditions). Test The Vehicle, Going In Both Directions, On A Flat Road.	1. Front end misaligned. 2. Unbalanced steering gear valve. If this is the cause, steering effort will be very light in direction of lead and heavy in opposite direction. 3. Steering shaft rubbing the ID of the shaft tube.	1. Adjust to specifications. 2. Replace the gear valve. 3. Align the column.

GC6028800006010X

Fig. 1 Troubleshooting diagnosis chart (Part 1 of 3)

20. If pump pressures as within specifications, leave valve open and turn steering wheel to both stops.
21. Record highest pressures and compare with maximum pump pressure recorded.
22. If maximum pressure cannot be reached in either (or one) side of gear, gear is leaking internally and must be disassembled and repaired.
23. Turn ignition switch to Off position.
24. Remove testing gauge, connect pressure hose, inspect fluid level and/or make needed repairs.
25. If problem still exists, steering and front suspension must be thoroughly examined.

USING POWER STEERING ANALYZER

Power steering analyzer tool No. J-25323-A, or equivalent, will measure flow rate in addition to pressure.

P SERIES

1. Ensure ignition switch is in Off position.
2. Place suitable container under steering gear or pump.
3. Disconnect pressure hose at steering gear or power steering pump.
4. Connect analyzer tool No. J-25323-A, or equivalent, hoses to adapters. Thread female adapter into pressure hose and male adapter into gear or pump.
5. If analyzer tool has never been used bleed power steering system. Analyzer gate must be open during this procedure.
6. Add power steering fluid to pump as required.
7. Run engine at idle speed with gate valve open and record flow and pressure.
8. If flow is below 2 gallons per minute, pump may need repair, but continue test.
9. If pressure is more than 150 psi, inspect hoses for restriction and inspect steering gear.
10. Partially close gate valve to build 620 psi. Record flow.
11. If flow drops more than 1 gallon per minute under previously recorded flow proceed as follows:
    a. Disassemble pump and replace ring, rotor and vanes.
    b. Replace pressure plates if worn or cracked.
    c. Replace all O-ring seals when assembling pump.
12. Completely close and partially open gate valve three times. **Do not allow valve to remain closed for more than five seconds.**
13. Record gate closed pressure.
14. Check pressure specifications.
15. If pump pressure recorded is 100 psi lower than minimum specification, replace flow control valve in pump.
16. If pressure recorded is more than maximum specification, flow control valve in pump should be removed and cleaned or replaced.
17. If system is exceptionally dirty, both steering gear and pump must be completely disassembled and cleaned.
18. Increase engine speed from idle to 1500 RPM. Record flow.
19. If flow varies more than 1 gallon per minute from first flow, flow control valve should be removed and cleaned or replaced.
20. Turn steering wheel lightly against both stops. Record pressure and flow.
21. Pressures developed at both stops should be nearly equal to maximum pump output.
22. At same time, flow should drop below .5 gallon per minute.
23. If pressure does not reach maximum output or flow does not drop below specified valve, excessive internal leakage is occurring. Remove and disassemble steering gear, then control valve.
24. Turn steering wheel in both directions and release quickly while watching pressure gauge.
25. Needle should move from normal pressure reading and snap back as wheel is released.
26. If pressure comes back slowly or sticks, rotary valve in steering gear is sticking. Remove, disassemble and clean rotary valve.
27. If system contains excessive dirt and foreign material, disassemble and clean pump and gear.
28. If problem still exists, steering and front suspension must be thoroughly examined.

PROBLEM	POSSIBLE CAUSE	CORRECTION
Momentary Increase In Effort When Turning The Wheel Quickly To The Right Or Left	1. Low oil level in the pump. 2. Pump belt slipping. 3. High internal leakage (steering gear or pump).	1. Add power steering fluid as required. 2. Adjust as necessary. 3. Refer to "Power Steering System Test"
Poor Return Of Steering	1. Tires under-inflated. 2. Lower coupling flange rubbing against the steering gear adjuster plug. 3. Steering wheel rubbing against directional signal housing. 4. Tight or frozen steering shaft bearings. 5. Steering linkage or ball joints binding. 6. Steering gear to column misalignment. 7. Tie rod pivots not centralized. 8. Lack of lubricant in the suspension ball joints and the steering linkage. 9. Stuck or plugged valve spool. 10. Rubber spacer binding in the shift tube. 11. Improper front end alignment. 12. Steering gear adjusted too tightly. 13. Kink in return hose. 14. Steering intermediate shaft stone shield side-loaded against shaft assembly.	1. Inflate to specified pressure. 2. Loosen the pinch bolt and assemble properly. 3. Adjust the steering jacket. 4. Replace the bearings. 5. Replace the affected parts. 6. Align the steering column. 7. Adjust tie rod ends as required to center pivots. 8. Lubricate. 9. Remove and clean or replace the valve. 10. Make certain the spacer is properly seated. Lubricate inside the diameter with silicone lubricant. 11. Check and adjust to specifications. 12. Adjust over-center and thrust bearing preload to specifications. 13. Replace the hose. 14. Eliminate side-load.
Steering Wheel Surges Or Jerks When Turning With Engine Running Especially During Parking	1. Low oil level in pump 2. Loose pump belt. 3. Sticky flow control valve. 4. Insufficient pump pressure. 5. Faulty gear relief valve.	1. Add power steering fluid as required. 2. Adjust as necessary. 3. Replace or clean the control valve. 4. Refer to "Power Steering System Test" 5. Replace the gear relief valve.
Hard Steering Effort In Both Directions	1. Low tire pressure. 2. Lack of lubricant in suspension or ball joints (Worn/contaminated joints). 3. Steering gear to column misalignment. 4. Pump belt slipping. 5. Low fluid level in reservoir. 6. High internal leakage (steering gear or pump). 7. Sticky flow control valve. 8. Lower coupling flange rubbing against steering gear adjuster plug. 9. Steering gear adjusted too tight. 10. Improper front end alignment.	1. Adjust the tire pressure. 2. Lubricate and relubricate at proper intervals or replace joints. 3. Align the steering column. 4. Tighten or replace belt. 5. Fill to proper level. Inspect lines and joints for external leakage. 6. Refer to "Power Steering System Test" in this section. 7. Replace or clean the valve. 8. Loosen the pinch bolt and assembly properly. 9. Adjust over-center and thrust bearing preload to specifications. 10. Check and adjust to specifications.
Foaming Milky Looking Power Steering Fluid, Low Level And Possible Low Pressure	1. Air in the fluid, and loss of fluid due to internal pump leakage causing overflow. 2. Hose or air leakage in reservoir line.	Check for leak and correct. Bleed system. Extremely cold temperatures will cause system aeration should the oil level be low. If oil level is correct and pump still foams, remove pump from vehicle and separate reservoir from housing. Check welsh plug and housing for cracks. If plug is loose or housing is cracked, replace housing.

GC6028800006020X

Fig. 1 Troubleshooting diagnosis chart (Part 2 of 3)

POWER STEERING SYSTEM SERVICE

System Flush

1. Raise and support front end of vehicle
2. Remove fluid return hose at pump inlet connector and plug connector port on pump. Position hose in suitable large container.
3. While an assistant is filling reservoir with new power steering fluid, run engine at idle.
4. Turn steering wheel from stop to stop. **Do not contact wheel stops or hold wheel in corner as fluid will stop and pump will be in pressure relief mode. Sudden overflow from reservoir may develop if wheel is held at stop.**
5. Install all pipes and hoses.
6. Fill system with new power steering fluid and bleed system as outlined under "Power Steering System Bleed."
7. Operate engine for 15 minutes.
8. Remove pump return hose at pump inlet and plug connection on pump.
9. While refilling reservoir, inspect draining fluid for contamination.
10. If foreign material is still evident, replace all hoses, disassemble and

clean or replace power steering system components. **Do not reuse any drained power steering fluid.**

POWER STEERING SYSTEM BLEED

1. Ensure ignition switch is in Off position.
2. Raise and support front end of vehicle.
3. Turn steering wheel fully to left.
4. Fill pump fluid reservoir to proper level.
5. Level engine off.
6. With assistant inspecting level and condition of fluid, then steering wheel fully left and right at least 20 times. If system has long return lines or fluid coolers, turn at least 40 times.
7. Thoroughly clean any overflow fluid.
8. Keep fluid level at proper level.
9. ensure there are no bubbles in fluid.
10. Start engine and idle. Maintain proper fluid level.
11. Center wheels and lower vehicle.
12. Keep engine running for at least two minutes.
13. Turn steering wheel in both directions and ensure proper operation.

Component Service

1997-98

When servicing pump, refer to **Fig. 2.**

Disassemble

Before disassembly of pump, remove filler cap and drain fluid. If broken components or foreign materials are found during disassembly, hydraulic system should be disassembled, inspected, cleaned and flushed before servicing is complete.

1. Clean exterior of pump with solvent and crocus cloth.
2. Remove bolt and fitting from rear of pump reservoir, then the reservoir and seals.
3. Remove end plate retaining ring using suitable screwdriver and punch.
4. Remove end plate and pressure plate spring, then the O-ring, control valve and control valve spring by inverting housing.
5. Tap lightly on driveshaft with suitable rubber mallet to remove pressure plate.
6. Pull out pump ring and vanes, then remove shaft retaining ring, pump rotor and thrust plate.
7. Remove driveshaft key from slot in shaft, then with end of shaft pointed downward, press down until shaft is free.
8. Remove seals, dowel pins and O-rings.

PROBLEM	POSSIBLE CAUSE	CORRECTION
Low Oil Pressure Due To Restriction In The Hose	1. Check for kinks in the hose. 2. Foreign object stuck in the hose.	1. Remove the kinks or replace the hose. 2. Remove the foreign object or replace the hose.
Low Oil Pressure Due To Steering Gear. Refer To "Power Steering System Test"	1. Pressure loss in cylinder due to worn piston ring or scored housing bore. 2. Leakage at the valve rings and valve body to the worm seal. 3. Leakage at the valve body or a loose fitting spool. 4. Damaged poppet valve	1. Disassemble the steering gear as outlined in the unit repair manual. Inspect the ring and housing bore. Replace the affected parts. 2. Disassemble steering gear and replace seals. 3. Replace the valve. 4. Replace the poppet valve.
Low Oil Pressure Due To Steering Pump. Refer To "Power Steering System Test"	1. Flow control valve stuck or inoperative. 2. Pressure plate not flat against the cam ring. 3. Extreme wear of cam ring. 4. Scored pressure plate, thrust plate or rotor. 5. Vanes sticking in rotor slots. 6. Vanes not installed properly. 7. Air in oil. 8. Low oil level. 9. Pump belt slipping. 10. Damaged hoses or steering gear.	1. Replace or clean the valve. 2. Replace the pressure plate. 3. Replace and flush the system. 4. Replace parts. (If rotor, replace with rotating group), flush the system. 5. Free-up by removing burrs, varnish or dirt. 6. Install properly. Radius edge to the outside. 7. Locate source of leak and correct. Bleed the system. 8. Add power steering fluid as required. 9. Adjust as necessary. 10. Replace as necessary.
Chirp Noise In Steering Pump	Pump belt slipping.	Adjust as necessary.
Belt Squeal (Particularly Noticeable At Full Wheel Travel And Standstill Parking)	Pump belt slipping.	Adjust as necessary.
Growl Noise In Steering Pump	Excessive back pressure in hoses or steering gear caused by restriction.	Locate restriction and correct.
Growl Noise In Steering Pump (Particularly Noticeable At Standstill Parking)	1. Scored pressure plates, thrust plate or rotor. 2. Extreme wear of cam ring.	1. Replace parts and flush system. 2. Replace parts.
Groan Noise In Steering Pump	1. Low oil level. 2. Air in the oil. Poor pressure hose connection.	1. Add power steering fluid as required. 2. Torque the connector. Bleed the system.
Rattle Or Knock Noise In Steering Pump	1. Loose pump pulley nut. 2. Pump vanes sticking in rotor slots. 3. Pressure hose touching other parts of vehicle.	1. Torque nut. 2. Free up by removing burrs, varnish or dirt. 3. Adjust hose position.
Swish Noise In Steering Pump	Faulty flow control valve.	Replace part.
Whine Noise In Steering Pump	Pump shaft bearing scored.	Replace the housing and shaft. Flush the system.

GC6028800006030X

Fig. 1 Troubleshooting diagnosis chart (Part 3 of 3)

Inspection

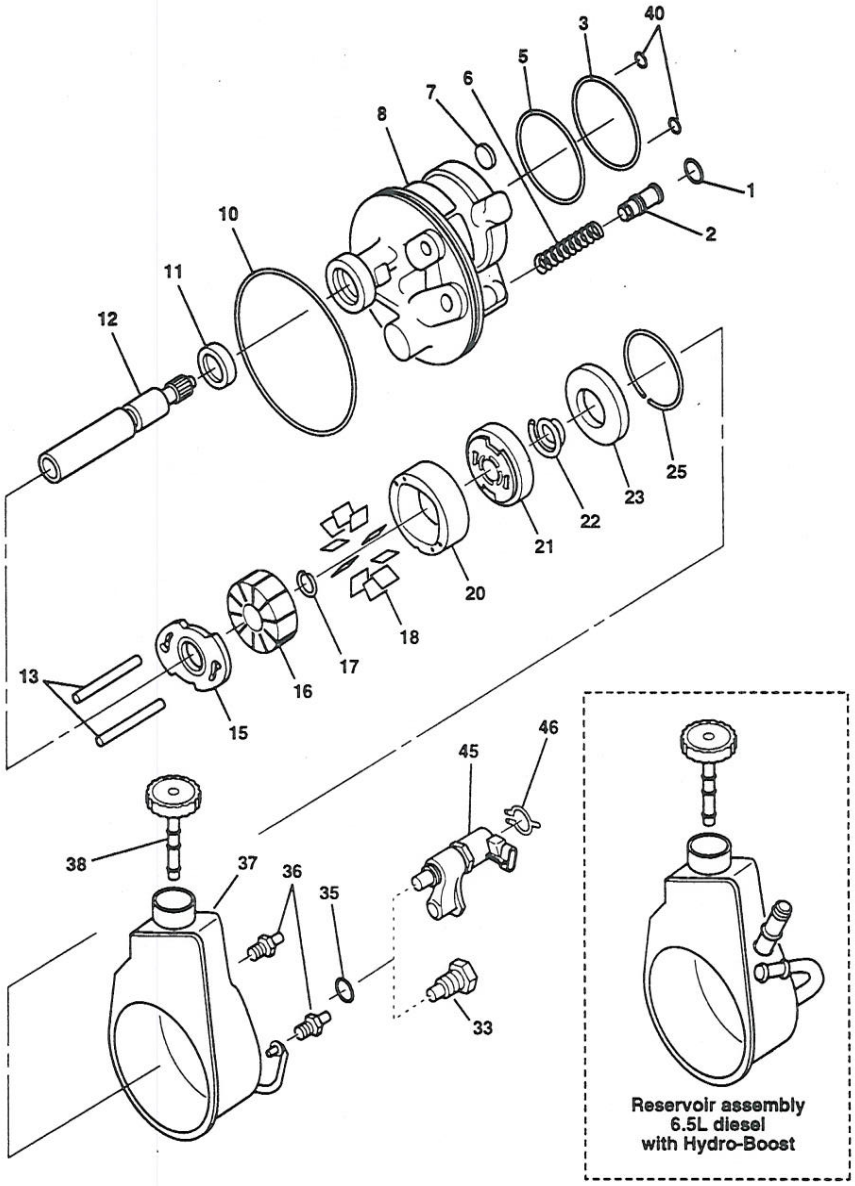
1. Clean all parts with solvent and blow dry.
2. Check vane tips for scoring or wear. Vanes must fit snugly but slide freely in slots of rotor. Examine rotor slots for burrs and excessive wear at thrust faces.
3. Check inner surface of pump ring for scoring or wear and thrust plate and pressure plate for wear on plate surfaces.
4. If heavy wear is evident in any of above components, replace entire rotating group.
5. Inspect seal for leakage, cracking or swelling, if evident replace seal.
6. Check driveshaft for excessive burning or scoring.
7. Control valve must move smoothly in valve bore.

Assemble

1. Lubricate O-rings, pump ring, rotor and vanes with power steering fluid.
2. Install O-rings and dowel pins on pump housing.
3. Insert seal into front of housing with suitable seal installation tool No. J-7728, or equivalent.
4. Install driveshaft and thrust plate. Ensure counterbore faces driveshaft end of housing and install rotor.
5. Insert vanes into rotor, ensuring rounded edge faces away from rotor.
6. Install shaft retaining ring, pump ring and pressure plate.
7. Insert control valve spring, then install control valve and O-ring.
8. Install pressure plate spring and end plate, then secure with end plate retaining ring.
9. Connect seal and reservoir, then install bolt and fitting.

1999-2001

There is no "Disassemble" or "Assemble" procedures available for these pumps.



Key No.	Part Name
1	SEAL, RECTANGULAR SECTION
2	VALVE ASM, CONTROL
3	SEAL, O-RING
5	SEAL, O-RING
6	SPRING, FLOW CONTROL
7	MAGNET
8	HOUSING ASM, PUMP
10	SEAL, O-RING (HOUSING)
11	SEAL, DRIVE SHAFT
12	SHAFT, DRIVE
13	PIN, DOWEL
15	PLATE, THRUST
16	ROTOR, PUMP
17	RING, SHAFT RETAINING

Key No.	Part Name
18	VANE, PUMP
20	RING, PUMP
21	PLATE, PRESSURE
22	SPRING, PRESSURE PLATE
23	PLATE, END
25	RING, END PLATE RETAINING
33	FITTING ASM (CONNECTOR &)
35	SEAL, O-RING
36	STUD, PUMP MOUNTING
37	RESERVOIR ASM
38	ASM, RESERVOIR
40	SEAL, RECTANGULAR SECTION
45	ACTUATOR & FITTING ASM, EVO
46	CLIP, RETAINING

GC60288000070000X

Fig. 2 Exploded view of power steering pump. 1997–98

TIGHTENING SPECIFICATIONS

Component	Torque, Ft. Lbs.
ASTRO & SAFARI	
Cooler Bracket	18
Hose Clamp	18①
Pressure Hose Flare Nut	20
Pump Control Valve	55
Pump Fitting Assembly	55
Pump Mounting Bolt	37
Pump Mounting Nut	30
Pump Mounting Stud	43
Remote Reservoir Mounting Bolts	35①
Reservoir To Steering Pump Housing Clamps	35①
C & K SERIES	
Front Brace (6.5L Engine)	30
Pressure Line Fitting	20
Pump Fitting Assembly	55
Pump Mounting	37
Rear Brace Bolt (7.4L Engine)	24
Rear Brace Nut (7.4L Engine)	37
Rear Mounting Nut (6.5L Engine)	17
Side Cover Bolts	48
G VAN & P SERIES	
Cooler	44①
Coupling Flange Bolt	75
Coupling Flange Nut	20
Flow Control Fitting	35
Hose Clamp	14①
Power Steering Pump To Booster Line	20
Pressure Hose	20
Pump To Brace (4.3L, 5.0L & 5.7L Engines)	37
Pump To Brace (6.5L Diesel Engine)	32
Pump To Brace (7.4L Engine)	18
Pump To Bracket (4.3L, 5.0L & 5.7L Engines)	30
Pump To Bracket (6.5L Diesel Engine)	49
Pump To Cooler	21
Pump To Cylinder Head	49
Pump To Engine Stud	15
Reservoir Bolt	35
Return Line At Booster And Gear	25
Side Cover To Housing Bolt	45
S & T SERIES	
Cooler	84①
Filler Neck	15
Front Mounting Bolt (2.2L Engine)	22
Front Mounting Bolt (4.3L Engine)	37
Front Mounting Nut (4.3L Engine)	31
Hose Clamp	18
Hose Coupling	21
Lower Clamp Bolt	26
O-Ring Union Fitting	55
Pressure Line Fitting	20
Rear Bracket (2.2L Engine)	37
Rear Bracket (4.3L Engine)	31
Side Cover Bolts	45
1999–2000 SILVERADO, SIERRA & 2000 SUBURBAN, TAHOE & YUKON	
Front Mount	37
Pressure Hose	24
Rear Mount	37

① — Inch lbs.

Vane Type Power Steering Pump Less Integral Reservoir

INDEX

	Page No.
Description	15-8
Diagnosis & Testing	15-8
Power Steering System Test	15-8
Power Steering System Bleed	15-8
Component Service	15-8
CB Series	15-8
TC Series	15-9
Power Steering System Service	15-8
Power Steering System Flush	15-8
Tightening Specifications	15-12
Troubleshooting	15-8

DESCRIPTION

The hydraulic pump is a non-submerged vane-type design. The housing and internal parts are separate from the reservoir and are not submerged in fluid.

There are two bore openings at the rear of the pump housing. The larger opening contains the cam ring, pressure plate, thrust plate, rotor and vane assembly, and end plate. The smaller opening contains the pressure line union, flow control valve and spring. The pressure relief valve inside the flow control valve limits pump pressure.

TROUBLESHOOTING

Refer to "Vane Type Power Steering Pump w/Integral Reservoir" for troubleshooting charts.

DIAGNOSIS & TESTING

POWER STEERING SYSTEM TEST

All tests are performed with engine idling at normal operating temperature.

1. Ensure ignition switch is in Off position.
2. Place suitable small container under gear or pump to catch any fluid that may leak out.
3. Connect power steering pressure tester tool No. J-5176-D, or equivalent, to both hoses. Gauge must be between shutoff valve and pump.
4. Open shutoff valve.
5. Start engine. All engine to reach normal operating temperature.
6. Operating pressure range with tester valve open is 80–125 psi.
7. Inspect and adjust fluid level as required.
8. If pressure exceeds 150 psi, inspect hoses for restrictions.
9. **System relief pressure should not be maintained for more than five seconds.**
10. Open and close gauge valve fully three times and record highest pressure attained each time.
11. If pressure is within specifications and readings are within 50 psi of each other, pump is functioning satisfactorily.
12. If pressure readings are within specifications, but are not within 50 psi of each other, pump valve is sticking. Proceed as follows:
    a. Remove valve.
    b. Clean valve.
    c. If system contains dirt, flush system.
    d. If system is extremely dirty, disassemble and clean pump and steering gear.
13. If pressures are consistent but are below 100 psi of minimum specifications, replace flow control valve.
14. If pressures are still low, replace rotating group.
15. If pump pressures are within specifications, leave valve open and turn steering wheel to both stops.
16. Record highest pressures and compare with maximum pump pressures recorded.
17. If maximum pump pressure cannot be built at either stop, gear is leaking internally and must be disassembled and repaired.
18. Turn ignition switch to Off position.
19. Remove testing gauge, connect pressure hose, inspect fluid level and perform needed repairs as required.
20. If problem still exists, steering and front suspension must be thoroughly examined.

POWER STEERING SYSTEM SERVICE

Power Steering System Flush

Refer to "Vane Type Power Steering Pump, w/Integral Reservoir" for flushing procedure.

POWER STEERING SYSTEM BLEED

Refer to "Vane Type Power Steering Pump, w/Integral Reservoir" for system bleeding procedure.

Component Service

CB SERIES

When serving pump, refer to **Fig. 1.**

Disassemble

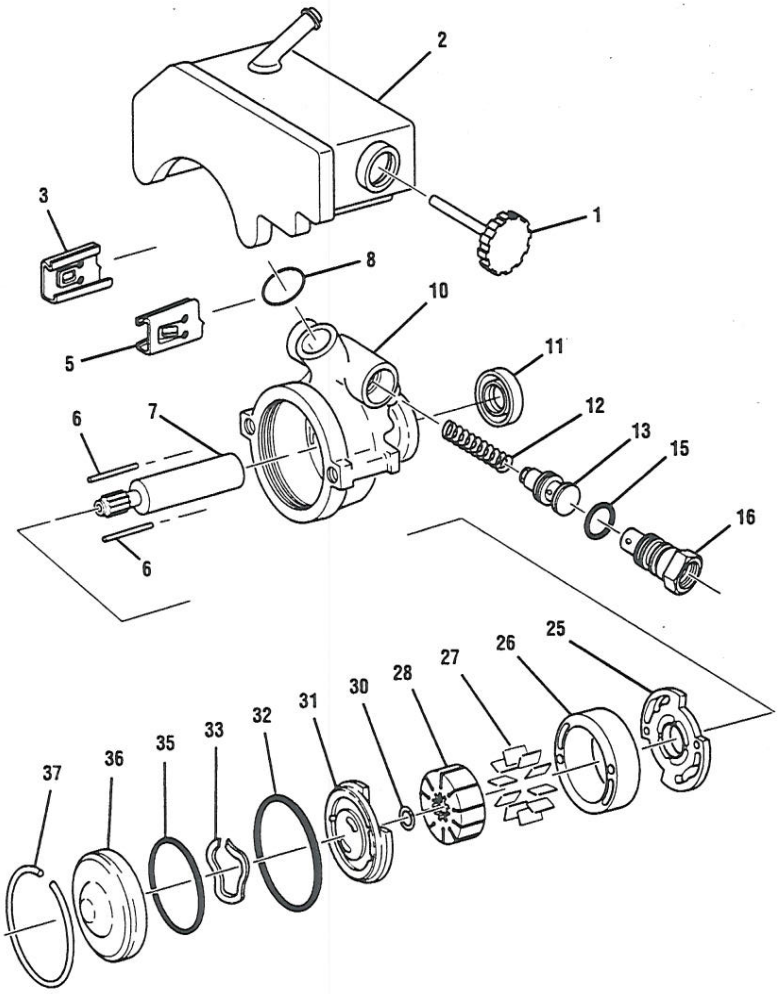
1. Remove reservoir retaining clips from reservoir assembly and housing.
2. Separate reservoir from housing, then remove O-ring from reservoir.
3. Remove O-ring union fitting and O-ring.
4. Remove control valve assembly and flow control spring.
5. Protect driveshaft with shim stock, **Fig. 2.**
6. Cut driveshaft seal using suitable small chisel.
7. Remove driveshaft seal from housing.
8. Insert suitable small punch through access hole in housing, then remove retaining ring from housing, **Fig. 3.**
9. Remove pump internal components by gently pushing on driveshaft.
10. Remove O-ring from pump housing.
11. Remove dowel pins, end cover, pressure plate spring and O-ring from pressure plate.
12. Remove pump ring and vanes from driveshaft subassembly.
13. Remove shaft retaining ring from driveshaft.
14. Remove pump rotor and thrust plate from driveshaft.

Inspection

1. Check following parts for any scoring, pitting or chatter marks:
   a. Pressure plate.
   b. Pump ring.
   c. Rotor.
   d. Vanes.
   e. Thrust plate.
   f. Driveshaft.
2. Replace any parts with any signs of excessive wear or damage.

Assemble

1. Clean all parts in power steering fluid, then thoroughly dry all parts.
2. Lubricate new driveshaft seal with power steering fluid, then install seal into pump housing using suitable seal installation tool or socket.
3. Install pump ring dowel pins into pump housing.
4. Install thrust plate, pump rotor and new shaft retaining ring onto driveshaft.
5. Install driveshaft subassembly into pump housing.
6. Install vanes into pump rotor.



1 - CAPSTICK ASM, RESERVOIR
2 - RESERVOIR ASM, HYD PUMP (TYPICAL)
3 - CLIP, RESERVOIR RETAINING (LH)
5 - CLIP, RESERVOIR RETAINING (RH)
6 - PIN, PUMP RING DOWEL
7 - SHAFT, DRIVE
8 - SEAL, O-RING
10 - HOUSING ASM, HYD PUMP
11 - SEAL, DRIVE SHAFT
12 - SPRING, FLOW CONTROL
13 - VALVE ASM, CONTROL
15 - SEAL, O-RING
16 - FITTING, O-RING UNION
25 - PLATE, THRUST
26 - RING, PUMP
27 - VANE
28 - ROTOR, PUMP
30 - RING, SHAFT RETAINING
31 - PLATE, PRESSURE
32 - SEAL, O-RING
33 - SPRING, PRESSURE PLATE
35 - SEAL, O-RING
36 - COVER, END
37 - RING, RETAINING

GC60295001210000X

Fig. 1 Exploded view of CB series power steering pump

7. Install pump ring onto dowel pins, **Fig. 4.**
8. Lubricate new oil ring with power steering fluid, then install O-ring into end cover.
9. Lubricate outer edge of end cover with power steering fluid, then press end cover into pump housing.
10. Insert O-ring into groove in pump housing with ring opening near access hole in pump housing.

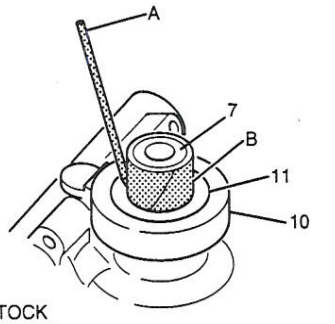
TC SERIES

When serving pump, refer to **Fig. 5.**

Disassemble

Prior to disassembly of the pump, remove filler cap and drain fluid. If broken components or foreign materials are found during disassembly, then the hydraulic system should be disassembled, inspected, cleaned and flushed before service is complete.

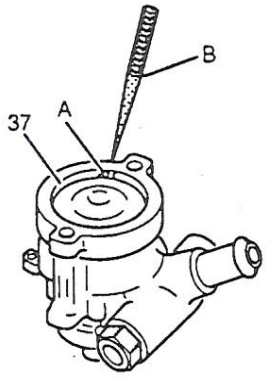
1. Clean exterior of pump with solvent, then clamp pump front hub into suitable soft jaw vise.
2. Pry tab and slide retaining clip off pump, **Fig. 6.**
3. Install five ⅝ inch washers and 9/16-12 nut outside of return tube, **Fig. 7.**
4. Plug tube to prevent chips from entering, then insert 9/16-12 tap into return tube and turn until tube is pulled out of housing, **Fig. 7.**



A-CHISEL
B-SHIM STOCK
7-SHAFT, DRIVE
10-HOUSING ASM, HYD PUMP
11-SEAL, DRIVE SHAFT

GC60295001220000X

Fig. 2 Shaft seal removal. CB series pump



A-ACCESS HOLE
B-PUNCH
37-RING, RETAINING

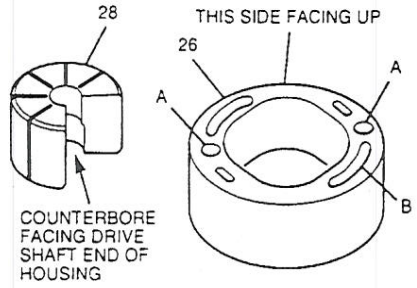
GC60295001230000X

Fig. 3 Retaining ring removal. CB series pump

5. Remove O-ring, fitting, O-ring seal, flow control valve and spring, **Fig. 8.**
6. Remove retaining ring with suitable snap ring pliers. Note position of large lug in housing before removal, **Fig. 9.**
7. Remove driveshaft and bearing, **Fig. 10.** Note and measure any clearance between collar and shaft.
8. Press bearing from shaft using support ring under bearing.
9. Remove driveshaft seal by prying seal loose with suitable screwdriver.
10. Insert suitable punch into access hole and pry retaining ring loose with suitable screwdriver, **Fig. 11.**
11. Using 5/16 inch piece of bar stock or suitable brass drift, remove thrust plate, **Fig. 12.**
12. Remove pump ring, rotor, vanes and dowel pins.
13. Remove pressure plate and O-ring, then the spring, seal and remaining dowel pin.
14. Remove sleeve assembly using suitable punch.

Inspection

1. Clean all parts with solvent and blow dry.
2. Inspect rotating components as follows:



A-DOWEL PIN HOLE (LARGE)
B-CROSS-OVER SLOT
26-RING, PUMP
28-ROTOR, PUMP

GC60295001240000X

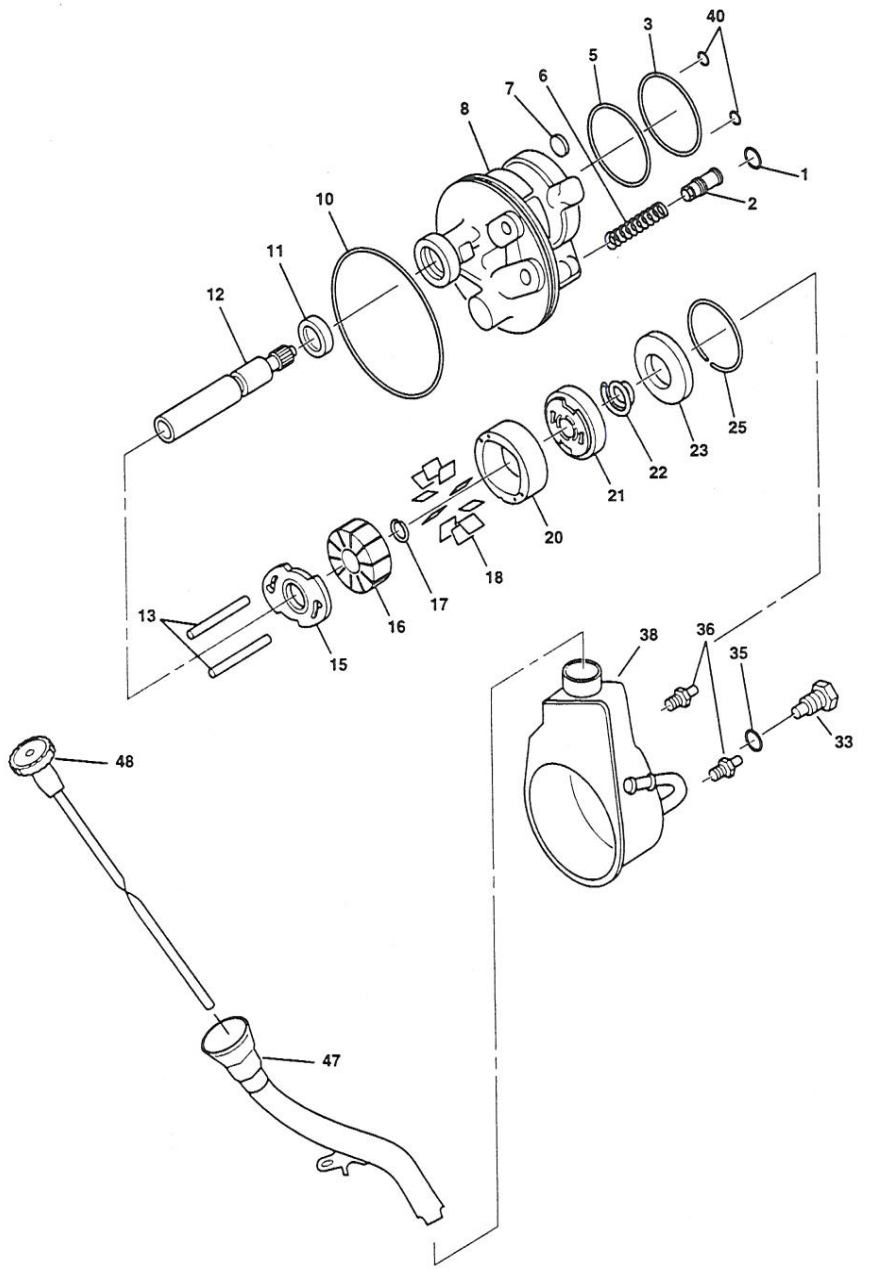
Fig. 4 Pump ring installation. CB series pump

a. Vane tips for scoring or wear.
b. Fit of vanes in rotor. Vanes must fit properly in slots without sticking or excessive play.
c. Rotor slots for burrs and excessive wear at thrust faces.
d. Inner surface of pump ring for scoring or wear.
e. Thrust plate and pressure plate for wear on plate surfaces.
f. If heavy wear is present, or parts are faulty, replace entire rotating group.

3. Inspect bearing for rough or looseness and bearing seal for leakage, cracking or swelling.
4. Check driveshaft and bearing bore for excessive burning or scoring.
5. Control valve must move smoothly in valve bore.

Assemble

1. Press sleeve into housing using suitable socket and press.
2. Install dowel pin, seal and pressure plate spring, **Fig. 13.**
3. Install O-ring seal, pressure plate and dowel pins. Mark top of pressure plate where pin enters from underneath to ease alignment with dowel pin during assembly, **Fig. 14.**
4. Lubricate O-ring, pump ring, rotor and vanes with power steering fluid. Install vanes and rotor with rounded edge facing away from rotor. Ensure counterbore of rotor faces driveshaft end of housing.
5. Install pump ring with identification marks facing up, then install O-ring seal and thrust plate. Thrust plate dimples must line up with bolt holes in housing and plate must engage pump ring dowel pins.
6. Using suitable press to compress thrust plate, install retaining plate with center opening of ring with bolt hole nearest access hole, **Fig. 15.**
7. Install driveshaft seal into housing until it bottoms, using suitable socket and press.
8. Install bearing onto driveshaft, **Fig. 10,** then slide assembly into housing while rotating driveshaft so shaft serrations engage with rotor.
9. Insert retaining ring ensuring large tab of ring is properly located, **Fig. 9.**
10. Install flow control spring, control valve, O-ring seal and O-ring.
11. Install reservoir or return tube, then clips if equipped.

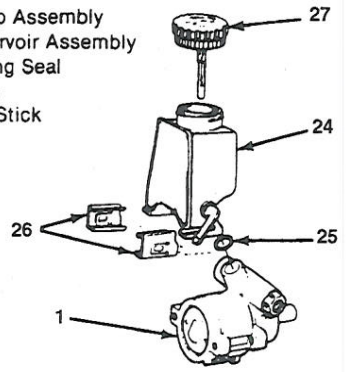


Key No.	Part Name
1	SEAL, RECTANGULAR SECTION
2	VALVE ASM, CONTROL
3	SEAL, O-RING
5	SEAL, O-RING
6	SPRING, FLOW CONTROL
7	MAGNET
8	HOUSING ASM, PUMP
10	SEAL, O-RING (HOUSING)
11	SEAL, DRIVE SHAFT
12	SHAFT, DRIVE
13	PIN, DOWEL
15	PLATE, THRUST
16	ROTOR, PUMP
17	RING, SHAFT RETAINING
18	VANE, PUMP
20	RING, PUMP
21	PLATE, PRESSURE
22	SPRING, PRESSURE PLATE
23	PLATE, END
25	RING, END PLATE RETAINING
33	FITTING ASM (CONNECTOR &)
35	SEAL, O-RING
36	STUD, PUMP MOUNTING
38	ASM, RESERVOIR
40	SEAL, O-RING (HOUSING TO STUD)
47	FILL TUBE
48	CAP ASM, BLADE &

GC60288000080000X

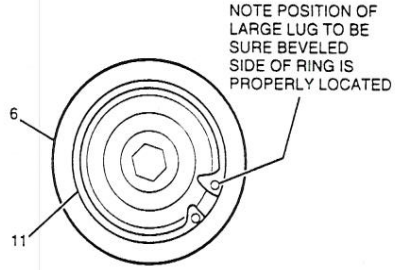
Fig. 5 Exploded view of TC series power steering pump

1. Pump Assembly
24. Reservoir Assembly
25. O-Ring Seal
26. Clips
27. Cap Stick



GC60288000090000X

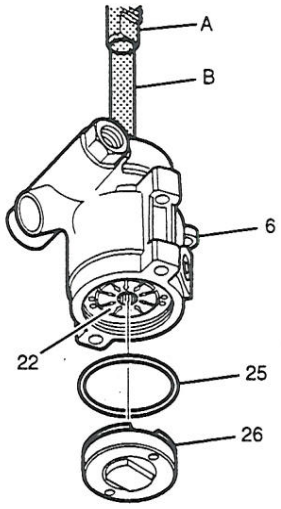
Fig. 6 Clip & reservoir removal. TC series pump



6-HOUSING ASM, HYD PUMP
11-RING, RETAINING

GC60288000120000X

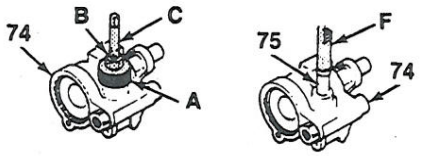
Fig. 9 Driveshaft retaining ring removal. TC series pump



A-PRESS
B-BAR STOCK
6-HOUSING ASM, HYD PUMP
22-ROTOR, PUMP
25-SEAL, O-RING
26-PLATE ASM, THRUST

GC60288000150000X

Fig. 12 Thrust plate removal. TC series pump



Remove return tube.

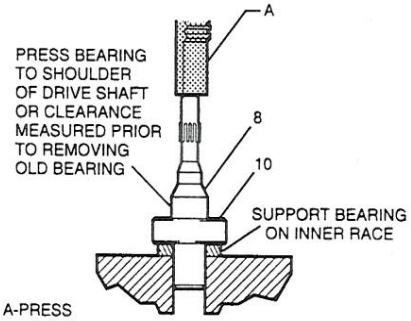
A. Five 5/8 Washers
B. One 9/16-12 Nut
C. One 9/16-12 Tap

Install return tube.

74. Housing
75. Return Tube

GC60288000100000X

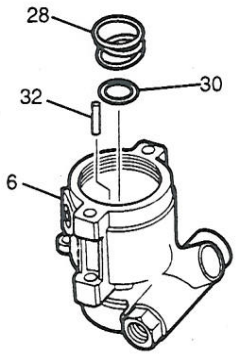
Fig. 7 Return tube removal. TC series pump


A
PRESS BEARING TO SHOULDER OF DRIVE SHAFT OR CLEARANCE MEASURED PRIOR TO REMOVING OLD BEARING
8
10
SUPPORT BEARING ON INNER RACE

A-PRESS
8-SHAFT, DRIVE
10-BEARING ASM, BALL

GC60288000130000X

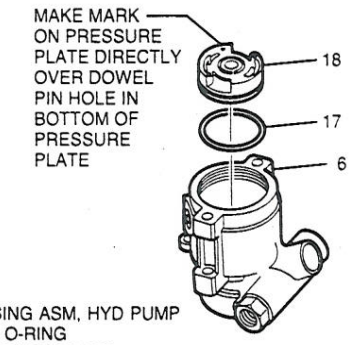
Fig. 10 Driveshaft & bearing removal. TC series pump



6-HOUSING ASM, HYD PUMP
28-SPRING, PRESSURE PLATE
30-SEAL, O-RING
32-PIN, DOWEL

GC60288000160000X

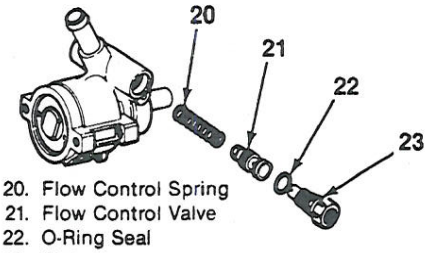
Fig. 13 Dowel pin installation. TC series pump



6-HOUSING ASM, HYD PUMP
17-SEAL, O-RING
18-PLATE, PRESSURE

GC60288000170000X

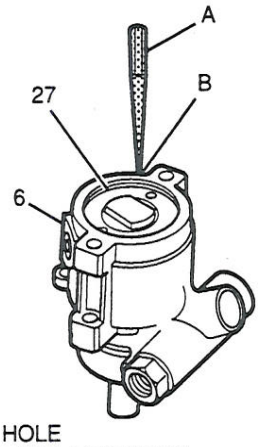
Fig. 14 Pressure plate alignment. TC series pump



20. Flow Control Spring
21. Flow Control Valve
22. O-Ring Seal
23. Fitting

GC60288000110000X

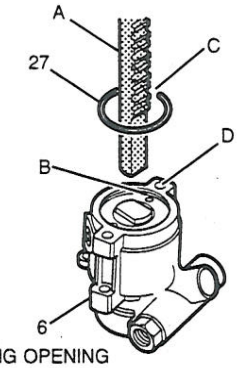
Fig. 8 Control valve assembly removal. TC series pump



A-PUNCH
B-ACCESS HOLE
6-HOUSING ASM, HYD PUMP
27-RING, THRUST PLATE RETAINING

GC60288000140000X

Fig. 11 Thrust plate retaining ring removal. TC series pump



A-PRESS
B-ACCESS HOLE
C-RETAINING RING OPENING
D-BOLT HOLE
6-HOUSING ASM, HYD PUMP
27-RING, THRUST PLATE RETAINING

GC60288000180000X

Fig. 15 Thrust plate compression. TC series pump

TIGHTENING SPECIFICATIONS

Component	Torque, Ft. Lbs.
AZTEK, MONTANA, SILHOUETTE, TRANS SPORT & VENTURE	
Cooler	20
Cylinder End Fittings	20
Hex Lock Nut	22
Hex Torque Prevailing Nut	①
O-Ring Union Fitting	55
Power Steering Line Fittings	20
Power Steering Pump Mounting Bolts	25
Valve End Fittings	13
S & T SERIES	
Cooler	84②
Filler Neck	15
Front Mounting Bolt (2.2L Engine)	22
Front Mounting Bolt (4.3L Engine)	37
Front Mounting Nut (4.3L Engine)	31
Hose Clamp	18
Hose Coupling	21
Lower Clamp Bolt	26
O-Ring Union Fitting	55
Pressure Line Fitting	20
Rear Bracket (2.2L Engine)	37
Rear Bracket (4.3L Engine)	31
Side Cover Bolts	45

① — 18 ft. lbs., then turn additional 180.°
② — Inch lbs.